

**REMARKS**

In this Response, Applicants amend claims 1, 21, 28, and 37. Claims 1-5, 8-37, 39, and 42-47 are currently pending, of which claims 1, 21, 28, and 37 are independent. Support for the claim amendments can be found in Applicants' specification at least at page 4, lines 6-21. Applicants respectfully request reconsideration of the outstanding rejections and allowance of all pending claims in view of the reasons set forth below.

**I. Rejection of Claims 1-3, 5, 21-23, 26-33, 36, 37, 39, and 44-47 under 35 U.S.C. § 103(a)**

Claims 1-3, 5, 21-23, 26-33, 36, 37, 39, and 44-47 are rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent Publication No. 2001/0025292 to Denk et al. (hereafter "Denk") in view of "Digital Filter Solutions" (hereafter "DFS") (Office Action, paragraph 4). Applicants respectfully traverse 35 U.S.C. § 103(a) rejection of claims 1-3, 5, 21-23, 26-33, 36, 37, 39, and 44-47 as set forth below.

**A. Claim 1**

Amended independent claim 1 recites:

“In a computer system, a method for implementing and using a filter object, the method comprising:  
providing the filter object, the filter object including a state, and the filter object being represented by:  
an output equation for generating an output of the filter object, and  
a state equation for updating the state of the filter object;  
implementing the filter object; and  
determining an output of the filter object based on an input to the filter object in a first dynamically typed text-based programming environment, determining the output of the filter object including:  
receiving the input at the filter object,  
identifying a first state of the filter object,  
splitting up the input into a first input and a second input,  
performing a first operation by processing the output equation to determine a first output of the filter object based on the first input of the filter object and the first state of the filter object,  
performing a second operation by processing the state equation to determine a second state of the filter object based on the first input of the filter object and the first state of the filter object,

retaining the second state of the filter object in the first dynamically typed text-based programming environment, making the second state available after the output equation of the filter object is processed, and performing a third operation by processing the output equation to determine a second output of the filter object based on the second input of the filter object and the second state of the filter object.”

**i. “performing a second operation by processing the state equation to determine a second state of the filter object based on the first input..., and performing a third operation by processing the output equation to determine a second output of the filter object based on the second input of the filter object and the second state of the filter object”**

Denk and DFS, alone or in any reasonable combination, fail to disclose or suggest “**performing a second operation** by processing the state equation to determine a second state of the filter object based on the first input..., and **performing a third operation** by processing the output equation to determine a second output of the filter object based on the second input of the filter object and the second state of the filter object,” as recited in claim 1.

Denk relates to reducing precision of an input signal by comparing a portion of the input signal to a preselected threshold value, and determining a selectable bias responsive to the comparison (Denk, abstract). Denk discusses a state with respect to bias rounding, but does not disclose or suggest how a state is determined. Since Denk does not disclose or suggest how a state is determined, Denk cannot disclose or suggest how a second state is determined for a filter object. Therefore, Denk does not disclose or suggest “performing a second operation by processing the state equation to determine a second state of the filter object based on the first input..., and performing a third operation by processing the output equation to determine a second output of the filter object based on the second input of the filter object and the second state of the filter object,” as recited in claim 1.

The teachings of DFS do not supplement Denk in such a way as to cure the failure of Denk to disclose or suggest the above feature of claim 1.

A Z-transform is based on an input and “z” terms, in which “z” refers to an inverse past value. DFS discusses determining a Z-transform by performing a single operation which takes in a single input and generates a single output (DFS, pages 6 and 7). In DFS, **a single operation** computes the “z” inverse past values in the process of determining the output of the Z-transform.

In contrast, claim 1 requires **separate operations** for determining the second state and the second output. That is, in claim 1, the second state is first determined in the second operation by processing the state equation. This output of the second operation (i.e. the second state) is then used in the third operation to determine the second output of the filter object. DFS does not disclose or suggest “performing a second operation by processing the state equation to determine a second state of the filter object based on the first input..., and performing a third operation by processing the output equation to determine a second output of the filter object based on the second input of the filter object and the second state of the filter object,” as recited in claim 1.

Since neither Denk nor DFS disclose or suggest this feature of claim 1, a combination of Denk and DFS cannot support a valid 35 U.S.C. § 103(a) of claim 1.

**ii. “determining an output of the filter object based on an input to the filter object in a first dynamically typed text-based programming environment... splitting up the input into a first input and a second input”**

Denk and DFS, alone or in any reasonable combination, fail to disclose or suggest “determining an output of the filter object based on an input to the filter object in a first dynamically typed text-based programming environment... splitting up the input into a first input and a second input,” as recited in claim 1.

As discussed above, Denk relates to a method for reducing precision of an input signal (Denk, abstract). Although Denk discusses modeling the filter taps of a finite impulse response (FIR) filter (Denk, paragraph 122), Denk does not disclose or suggest determining the output of the FIR filter by splitting up an input to the filter into a first input and a second input, as required by claim 1. Denk does not disclose or suggest “determining an output of the filter object based

on an input to the filter object in a first dynamically typed text-based programming environment... splitting up the input into a first input and a second input,” as recited in claim 1.

The teachings of DFS do not supplement Denk in such a way as to cure the failure of Denk to disclose or suggest the above feature of claim 1.

DFS discusses using a Z-transform to create a digital filter, and shows a graphical implementation of Z-transforms (DFS, pages 7 and 8). As shown in the graphical implementations of exemplary Z-transforms, determining a Z-transform involves taking a single input (depicted at the top-left portion as “IN”), running the single input through the implementation of the Z-transform, and obtaining a single output (depicted at the top-right portion as “OUT”). Thus, DFS discusses that **each Z-transform uses a single input**, and does not disclose or suggest **splitting up an input into a first input and a second input**. More specifically, DFS does not disclose or suggest “determining an output of the filter object based on an input to the filter object in a first dynamically typed text-based programming environment... splitting up the input into a first input and a second input,” as recited in claim 1.

Since neither Denk nor DFS disclose or suggest this feature of claim 1, a combination of Denk and DFS cannot support a valid 35 U.S.C. § 103(a) of claim 1.

As such, Denk and DSF, alone or in any reasonable combination, fails to disclose or suggest each and every feature of amended claim 1. Accordingly, Applicants respectfully request the Examiner to reconsider and to withdraw the rejection of claim 1 under 35 U.S.C. § 103(a).

#### **B. Claims 2, 3 and 5**

Claims 2, 3 and 5 depend from claim 1 and, as such, incorporate each and every element of claim 1. Therefore, claims 2, 3 and 5 are allowable for at least the same reasons discussed above for claim 1. Accordingly, Applicants respectfully request the Examiner to reconsider and to withdraw the rejection of claims 2, 3 and 5 under 35 U.S.C. § 103(a).

**C. Claim 21**

Amended independent claim 21 recites:

“A computer-implemented method for generating an output of a system in response to an input to the system, the method comprising:

implementing the system using a dynamically typed text-based programming environment; and

using the system in the dynamically typed text-based programming environment, the system:

performing a first operation to determine a first output of the system based on a first input to the system and a first state of the system;

performing a second operation to determine a second state of the system based on the first input to the system and the first state of the system;

retaining the second state of the system in the dynamically typed text-based programming environment so that the second state is available after the output of the system is determined; and

performing a third operation to determine a second output of the system based on the second input to the system and the second state of the system.”

In view of the remarks set forth above in connection with claim 1, Applicants respectfully submit that Denk and DFS, alone or in any reasonable combination, fail to disclose or suggest at least the following feature of amended independent claim 21: “**performing a second operation** to determine a second state of the system based on the first input to the system..., and **performing a third operation** to determine a second output of the system based on the second input to the system and the second state of the system.” A combination of Denk and DFS does not disclose or suggest performing separate operations to determine a second state of a system and a second output of the system. Accordingly, Applicants respectfully request the Examiner to reconsider and to withdraw the rejection of claim 21 under 35 U.S.C. § 103(a).

**D. Claims 22, 23, 26 and 27**

Claims 22, 23, 26 and 27 depend from claim 21 and, as such, incorporate each and every element of claim 21. Therefore, claims 22, 23, 26 and 27 are allowable for at least the same reasons discussed above for claim 21. Accordingly, Applicants respectfully request the

Examiner to reconsider and to withdraw the rejection of claims 22, 23, 26 and 27 under 35 U.S.C. § 103(a).

**E. Claim 28**

Amended independent claim 28 recites:

“A computer readable medium holding instructions executable in a computer that provides a dynamically typed text-based programming environment, the instructions comprising:  
    providing an object, the object being an instance of a class;  
    performing a first operation to determine a first output of the object based on a first input to the object and a first state of the object;  
    performing a second operation to determine a second state of the object based on the first input to the object and the first state of the object;  
    retaining the second state of the object in the dynamically typed text-based programming environment;  
    making the second state available after determining the output of the object; and  
    performing a third operation to determine a second output of the object based on a second input to the object and the second state of the object.”

In view of the remarks set forth above in connection with claim 1, Applicants respectfully submit that Denk and DFS, alone or in any reasonable combination, fail to disclose or suggest at least the following feature of amended independent claim 28: “**performing a second operation** to determine a second state of the object based on the first input to the object and the first state of the object, and **performing a third operation** to determine a second output of the object based on a second input to the object and the second state of the object.” A combination of Denk and DFS does not disclose or suggest performing separate operations determine a second state of an object and a second output of the object. Accordingly, Applicants respectfully request the Examiner to reconsider and to withdraw the rejection of claim 28 under 35 U.S.C. § 103(a).



**F. Claims 29-33 and 36**

Claims 29-33 and 36 depend from claim 28 and, as such, incorporate each and every element of claim 28. Therefore, claims 29-33 and 36 are allowable for at least the same reasons discussed above for claim 28. Accordingly, Applicants respectfully request the Examiner to reconsider and to withdraw the rejection of claims 29-33 and 36 under 35 U.S.C. § 103(a).

**G. Claim 37**

Amended independent claim 37 recites:

“A system for implementing a filter object, the system comprising:  
a processor configured to process:  
an output equation of the filter object processed in a first operation to determine a first output of the filter object based on a first input to the filter object and a first state of the filter object, and processed in a second operation to determine a second output of the filter object based on a second input to the filter object and a second state of the filter object;  
a state equation of the filter object processed in a third operation to determine the second state of the filter object based on the first input to the filter object and the first state of the filter object; and  
a memory for retaining the second state of the filter object in a dynamically typed text-based programming environment so that the second state is available after the output equation is processed.”

In view of the remarks set forth above in connection with claim 1, Applicants respectfully submit that Denk and DFS, alone or in any reasonable combination, fail to disclose or suggest at least the following feature of amended independent claim 37: “an output equation of the filter object... **processed in a second operation** to determine a second output of the filter object based on a second input to the filter object and a second state of the filter object, and a state equation of the filter object **processed in a third operation** to determine the second state of the filter object based on the first input to the filter object and the first state of the filter object.” A combination of Denk and DFS does not disclose or suggest performing separate operations to determine a second state of a filter object and a second output of the filter object. Accordingly, Applicants respectfully request the Examiner to reconsider and to withdraw the rejection of claim 37 under 35 U.S.C. § 103(a).

**H. Claims 39 and 44-47**

Claims 39 and 44-47 depend from claim 37 and, as such, incorporate each and every element of claim 37. Therefore, claims 39 and 44-47 are allowable for at least the same reasons discussed above for claim 37. Accordingly, Applicants respectfully request the Examiner to reconsider and to withdraw the rejection of claims 39 and 44-47 under 35 U.S.C. § 103(a).

**II. Rejection of Claims 4, 24, 25, 34, 42 and 43 under 35 U.S.C. § 103(a)**

Claims 4, 24, 25, 34, 42 and 43 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Denk in view of DFS and further in view of United States Patent Number 5,677,951 to Gay (hereafter “Gay”) (Office Action, paragraph 5). Applicants respectfully traverse 35 U.S.C. § 103(a) rejection of claims 4, 24, 25, 34, 42 and 43 as set forth below.

Denk and DFS have been summarized above

A combination of Denk, DFS and Gay does not disclose or suggest the features of claims 4, 24, 25, 34, 42 and 43. As discussed previously in connection with claim 1, a combination of Denk and DFS fails to disclose or suggest the features of claims 1, 21, 28, and 37 from which claims 4, 24, 25, 34, 42 and 43 depend. The teachings of Gay do not supplement Denk and DFS in such a way as to cure the shortcomings of Denk and DFS with respect to the features of independent claims 1, 21, 28, and 37.

Gay discusses an adaptive filtering technique applicable to acoustic echo cancellation (Col. 1, lines 6-8).

Gay fails to disclose or suggest “performing a second operation by processing the state equation to determine a second state of the filter object based on the first input..., and performing a third operation by processing the output equation to determine a second output of the filter object based on the second input of the filter object and the second state of the filter object,” as recited in amended independent claim 1. Although, Gay discusses a controller providing an audio restart signal to the process extension unit of the adaptive filter (Col. 3, lines 9-13), Gay does not disclose or suggest performing an operation by processing a state equation to determine a second state based on a first input... and performing another operation by processing an output equation to determine a second output based on a second input and the



second state. As such, a combination of Denk, DFS and Gay fails to disclose or suggest the features of claim 4 which depends on claim 1.

Gay fails to disclose or suggest “performing a second operation to determine a second state of the system based on the first input to the system..., and performing a third operation to determine a second output of the system based on the second input to the system and the second state of the system,” as recited in amended independent claim 21. Although, Gay discusses a controller providing an audio restart signal to the process extension unit of the adaptive filter (Col. 3, lines 9-13), Gay does not disclose or suggest performing an operation to determine a second state based on a first input... and performing another operation to determine a second output based on a second input and the second state. As such, a combination of Denk, DFS and Gay fails to disclose or suggest the features of claims 24 and 25 which depend on claim 21.

Gay fails to disclose or suggest “performing a second operation to determine a second state of the object based on the first input to the object and the first state of the object, and performing a third operation to determine a second output of the object based on a second input to the object and the second state of the object,” as recited in amended independent claim 28. Although, Gay discusses a controller providing an audio restart signal to the process extension unit of the adaptive filter (Col. 3, lines 9-13), Gay does not disclose or suggest performing an operation to determine a second state based on a first input... and performing another operation to determine a second output based on a second input and the second state. As such, a combination of Denk, DFS and Gay fails to disclose or suggest the features of claim 34 which depends on claim 28.

Gay fails to disclose or suggest “an output equation of the filter object... processed in a second operation to determine a second output of the filter object based on a second input to the filter object and a second state of the filter object, and a state equation of the filter object processed in a third operation to determine the second state of the filter object based on the first input to the filter object and the first state of the filter object,” as recited in amended independent claim 37. Although, Gay discusses a controller providing an audio restart signal to the process extension unit of the adaptive filter (Col. 3, lines 9-13), Gay does not disclose or suggest an operation to determine a second state based on a first input... and another operation to determine

a second output based on a second input and the second state. As such, a combination of Denk, DFS and Gay fails to disclose or suggest the features of claims 42 and 43 which depend on claim 37.

As such, a combination of Denk, DFS and Gay does not disclose or suggest each and every element of claims 4, 24, 25, 34, 42 and 43. Accordingly, Applicants respectfully request the Examiner to reconsider and to withdraw the rejection of claims 4, 24, 25, 34, 42 and 43 under 35 U.S.C. § 103(a).

### **III. Rejection of Claims 8-13 and 15-20 under 35 U.S.C. § 103(a)**

Claims 8-13 and 15-20 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Denk in view of DFS and further in view of “AutoCode Solutions” (hereafter “AutoCode”) (Office Action, paragraph 6). Applicants respectfully traverse 35 U.S.C. § 103(a) rejection of claims 8-13 and 15-20 as set forth below.

Denk and DFS have been summarized above in connection with claim 1.

A combination of Denk, DFS and AutoCode does not disclose or suggest the features of claims 8-13 and 15-20. As discussed previously in connection with claim 1, a combination of Denk and DFS fails to disclose or suggest the features of claim 1 from which claims 8-13 and 15-20 depend. The teachings of AutoCode do not supplement Denk and DFS in such a way as to cure the shortcomings of Denk and DFS with respect to the features of independent claim 1.

AutoCode discusses the capability to generate C code for a digital filter in the same form and precision, up to 16 digits, that is specified in a Z transform (AutoCode, “General Information”). The code is compatible with any standard C or C++ compiler (AutoCode, “General Information”). The filter may be initialized at any point in time to any value, except that pass band filters only initialize to zero (AutoCode, “General Information”). The filter starts with an initial value of zero at the first call (AutoCode, “General Information”).

AutoCode fails to disclose or suggest “performing a second operation by processing the state equation to determine a second state of the filter object based on the first input..., and performing a third operation by processing the output equation to determine a second output of the filter object based on the second input of the filter object and the second state of the filter

object,” as recited in amended independent claim 1. Although AutoCode discusses generating code for a digital filter that is specified in a Z transform, AutoCode does not disclose or suggest performing an operation to determine a second state based on a first input... and another operation to determine a second output based on a second input and the second state. As such, a combination of Denk, DFS and AutoCode fails to disclose or suggest the features of claims 8-13 and 15-20 which depend on claim 1.

As such, a combination of Denk, DFS and AutoCode does not disclose or suggest each and every element of claims 8-13 and 15-20. Accordingly, Applicants respectfully request the Examiner to reconsider and to withdraw the rejection of claims 8-13 and 15-20 under 35 U.S.C. § 103(a).

#### **IV. Rejection of Claim 14 under 35 U.S.C. § 103(a)**

Claim 14 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Denk in view of DFS, AutoCode and further in view of United States Patent Publication Number 2002/0121993 to Velazquez (hereafter “Velazquez”) (Office Action, paragraph 7). Applicants respectfully traverse 35 U.S.C. § 103(a) rejection of claim 14 as set forth below.

Denk, DFS and AutoCode have been summarized above.

A combination of Denk, DFS, AutoCode and Velazquez does not disclose or suggest the features of claim 14. As discussed previously in connection with claims 8-13 and 15-20, a combination of Denk, DFS and AutoCode fails to disclose or suggest the features of claim 1 from which claim 14 depends. The teachings of Velazquez do not supplement Denk, DFS and AutoCode in such a way as to cure the shortcomings of Denk, DFS and AutoCode with respect to the features of independent claim 1.

Velazquez discusses a compensator for compensating linearity errors, such as harmonic distortion and intermodulation distortion, in devices (Velazquez, abstract). The compensator includes a means for phase-shifting and a means for exponentiation to generate a compensation signal such that the linearity error distortion signals are canceled in the system output while maintaining the desired fundamental signal (Velazquez, abstract).

Velazquez fails to disclose or suggest “performing a second operation by processing the state equation to determine a second state of the filter object based on the first input..., and performing a third operation by processing the output equation to determine a second output of the filter object based on the second input of the filter object and the second state of the filter object,” as recited in amended independent claim 1. Although Velazquez discusses a compensator for compensating linearity errors, Velazquez does not disclose or suggest performing an operation to determine a second state based on a first input... and another operation to determine a second output based on a second input and the second state. As such, a combination of Denk, DFS, AutoCode and Velazquez fails to disclose or suggest the features of claim 14 which depends on claim 1.

As such, a combination of Denk, DFS, AutoCode and Velazquez does not disclose or suggest each and every element of claim 14. Accordingly, Applicants respectfully request the Examiner to reconsider and to withdraw the rejection of claim 14 under 35 U.S.C. § 103(a).

#### **V. Rejection of Claims 35 under 35 U.S.C. § 103(a)**

Claim 35 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Denk in view of DFS and further in view of United States Patent Publication Number 2002/0147554 to Pickerd (hereafter “Pickerd”) (Office Action, paragraph 8). Applicants respectfully traverse 35 U.S.C. § 103(a) rejection of claim 35 as set forth below.

Denk and DFS have been summarized above.

A combination of Denk, DFS and Pickerd does not disclose or suggest the features of claim 35. As discussed previously in connection with claim 28, a combination of Denk and DFS fails to disclose or suggest the features of claim 28 from which claim 35 depends. The teachings of Pickerd do not supplement Denk and DFS in such a way as to cure the shortcomings of Denk and DFS with respect to the features of independent claim 28.

Pickerd concerns test and measurement instruments, such as digital oscilloscopes (Pickerd, [0002]). Pickerd discusses a streaming distributed oscilloscope architecture that would reduce the dead time and increase the probability of detecting dead times (Pickerd, [0007]). As such, Pickerd is generally directed to hardware implementations.

Pickerd fails to disclose or suggest “performing a second operation to determine a second state of the object based on the first input to the object and the first state of the object, and performing a third operation to determine a second output of the object based on a second input to the object and the second state of the object,” as recited in amended independent claim 28. Although Pickerd discusses test and measurement instruments, Pickerd does not disclose or suggest performing an operation to determine a second state based on a first input... and another operation to determine a second output based on a second input and the second state. As such, a combination of Denk, DFS and Pickerd fails to disclose or suggest the features of claim 35 which depends on claim 28.

As such, a combination of Denk, DFS and Pickerd does not disclose or suggest each and every element of claim 35. Accordingly, Applicants respectfully request the Examiner to reconsider and to withdraw the rejection of claim 35 under 35 U.S.C. § 103(a).

**CONCLUSION**

In view of the above comments, Applicants believe the pending application is in condition for allowance and urge the Examiner to pass the claims to allowance. Should the Examiner feel that a teleconference would expedite the prosecution of this application, the Examiner is urged to contact the Applicants attorney at (617) 227-7400.

Please charge any shortage or credit any overpayment of fees to our Deposit Account No. 12-0080, under Order No. MWS-030RCE2. In the event that a petition for an extension of time is required to be submitted herewith, and the requisite petition does not accompany this response, the undersigned hereby petitions under 37 C.F.R. § 1.136(a) for an extension of time for as many months as are required to render this submission timely. Any fee due is authorized to be charged to the aforementioned Deposit Account.

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